Zero Retries issue 0047 2022-05-20

Technological innovation in Amateur Radio - Data Communications; Space; Microwave… the fun stuff! The Universal Purpose of Ham Radio is to have fun messing around with radios - Bob Witte K0NR. Ultimately, amateur radio must prove that it is useful for society - Dr. Karl Meinzer DJ4ZC. We are confronted by insurmountable opportunities! - Pogo. Nothing great has ever been accomplished without irrational exuberance - Tom Evslin. Irrational exuberance is pretty much the business model of Zero Retries Newsletter - Steve Stroh N8GNJ. What's life without whimsy? - Dr. Sheldon Cooper.

Zero Retries is a unique, quirky little highly independent, opinionated, self-published email newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.

About Zero Retries

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Request To Send

Hello from Ida Rupp Public Library (IRPL) in my hometown of Port Clinton Ohio. IRPL was one of my salvations during my formative years of 1968 - 1978 as a kid with significant technical curiousity in a town, and in a family where such curiosities were largely unsupported. Fortunately, there were a couple of like-minded friends, high school electronics classes, Popular Electronics magazine, and IRPL. I spent many hours at IRPL reading many magazines and books, especially after I discovered the possibilities of inter-library loan and the Reader's Guide to Periodical Literature and being able to request photocopies of specific articles (but not too many). Much of my "income" from newspaper routes went to my own subscriptions to Popular Electronics and a few other "must have" magazines, but any magazine that IRPL had a subscription for that was the least bit technical (Popular Science, Popular Mechanics, even Scientific American at times, etc.) was fodder for my technical curiosity. I first discovered Amateur Radio at IRPL through some donated issues of 73 Magazine that populated an otherwise unused slot in the magazine section. It's a bit surreal, but gratifying, to be sitting in IRPL today writing Zero Retries on a (laptop) computer that my teenage self could literally not have imagined. Not to mention the supercomputer with 1 Terabyte of storage in my pocket…

Hamvention is *now!* (as you are reading this). By the time this auto-publishes at 15:30 Pacific on 2022-05-20 (I *hope* that's when it will publish; Substack is a bit vague on the nuances of time zones when setting deferred publication), Hamvention 2022 Day 1 will be over. I'm writing this issue several days in advance, so there won't be any "cool new stuff" announcements from Hamvention in this issue; that will have to wait until at least Zero Retries 0048.

As mentioned in the following article, Icom's SHF Project is the only "Zero Retries Interesting" must-see (that I know of at the moment) at Hamvention 2022. It will be interesting to see it and most importantly to talk to Icom personnel that are present. I "have a few questions" for them:

- The choice of 2.4 GHz is understandable as it's "just up the spectrum" from the Amateur Radio 1240 - 1300 MHz band, but why *5.8 GHz*? Why not 10 GHz instead of 5.8 GHz? 10 GHz is a favorite band for microwave experimenters, DXers, and contesters.
- Why not fully embrace QO-100 operation, especially given the 2.4 GHz transmitter that's ideal for driving a 2.4 GHz power amplifier? If 10 GHz was included, it would be a very good fit for QO-100.
- Is it fully software defined (as in user-changeable)?
- What data modes does it have? Is it "backwards compatible" with Wi-Fi (such as 5 and 10 MHz channels as can be done with AREDN)?
- Any plans for "AREDN mode" to make it compatible with AREDN nodes on 2.3 and 5.8 GHz?
- And many more. Hopefully no one will object if I record the discussion so I can share the discussion in Zero Retries.

If you're at Hamvention, look for this hat. Literally everyone will be wearing their callsign on their head… but there will be *only one* ***Zero Retries***.

ZERO
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Lastly, kudos to Terrestrial Amateur Radio Packet Network (TARPN) for their NinoTNC project getting mentioned three times in this issue of Zero Retries - read on. There's some serious energy and technological innovation in that project.

de Steve N8GNJ

A Few Thoughts on Amateur Radio High Speed Data in the 2020s

One of the few "*Oooh…**Ahhh…***" interesting things to see at Hamvention 2022 will be Icom's "preview" of its SHF Project - see Zero Retries 0043 for more detail. One of the reasons to see it is that, to date, Icom has been the only "Amateur Radio" vendor to develop a high speed data mode specific to Amateur Radio spectrum - the D-Star "Digital Data" mode originally implemented in the Icom ID-1 radio. DD Mode was a pure data mode which offered 128 kbps using a 100 kHz channel in the 1240-1300 MHz band. The ID-1 debuted in approximately 2002, and although the ID-1 was discontinued several years ago, DD Mode continues in the Icom IC-9700, incorporating (I think…) all the capabilities of the ID-1.

Icom has not provided *any* specifics about the modes, data or otherwise, that it intends to offer in the "SHF Project" - only that it will operate in the 2.4 GHz and 5.8 GHz bands. Thus, we have no idea if it will go beyond the capabilities of DD Mode.

What started this article was that I was copied on a private email discussion thread that started by mentioning Dale Heatherington WA4DSY's (Silent Keyboard) 56k RF Modem which debuted in 1987. The "WA4DSY Modem" was, at the time, a groundbreaking data communications system for Amateur Radio, and was adaptable for the 220-225 MHz, 440-450 MHz band, or other bands, through the use of a 28 MHz (Input / Output frequency of the modem) transverter. There were a number of WA4DSY repeaters built, but (as far as I'm aware) they all faded out from having few users.

As discussed above, and mentioned in the private email discussion thread, the next "leap forward" in Amateur Radio data communications 56 kbps and faster was the Icom's D-Star 128 kbps DD Mode, the ID-1, and Icom's associated DD repeater. That worked… reasonably well, but Icom made some fundamental mistakes in the way its first DD repeater worked1, and its basic implementation of networking. Beyond those issues, the ID-1 suffered from being a 10 watt radio on 1240-1300 MHz and the resulting lack of range if you weren't using a directional antenna pointed at a repeater located at a high point on the terrain for good line of sight. Even with those issues, a number of DD Mode repeaters are *still* on the air, and of course those systems can now add new users because of the "ID-1" capability built into the Icom IC-9700 radio.

The private email discussion thread ended there, lamenting that there haven't been any improvements in Amateur Radio data speeds since DD mode, other than the inherently faster speeds used on Amateur Radio microwave networks based on lightly modified firmware for "outdoor" Wi-Fi units or Wireless Internet Service Provider (WISP) units.

I had a difference of opinion 😄 and replied:

> Yes, it was a fallow period after the ID-1 but things are moving again. The main point of progress is New Packet Radio - https://hackaday.io/project/164092-npr-new-packet-radio. NPR offers 512 kbps data speeds using a 100 kHz channel on 420-450 MHz. You can buy them from a vendor in Europe. The recommend power amplifier (needed for usable transmit power levels) was originally designed for DMR portables. Procuring that specific power amplifier is hit and miss to buy the right one. And of course the US [Amateur Radio] armchair lawyers piped up and declared the 512 kbps rate illegal in the US so the creator advises using a slower data rate in the US.

Actually, I was recently reminded that there's a second version of the New Packet Radio modem , as well as a companion power amplifier.

There are some interesting and instructive parallels between the WA4DSY 56k Modem and New Packet Radio:

- Both were pretty advanced technology compared to other data communications systems in Amateur Radio at the time. Notably, both were "pure data" systems, with no provision for (or limitations of) radios designed for voice. Thus, immediately they were intimidating to those whose previous exposure to data communications in Amateur Radio was 1200 bps Audio Frequency Shift Keying (AFSK) via a typical Amateur Radio VHF / UHF voice radios.

- Both use (require) a 100 kHz channel; again, an intimidating aspect for those used to typical 25 kHz / 20 kHz channels in Amateur Radio VHF / UHF. Not to mention going to the local "repeater coordination" group and requesting a 100 kHz channel allocation - minds get blown over such a request. "You need a… *what*?!?!?!"

- Both were “hobby” projects that eventually received some commercial support, but no real marketing, and thus minimal recognition within Amateur Radio.
- The commercial support was for the “radio”, but to make the system usable required an add-on unit. For WA4DSY 56k Modem, that was a transverter that wasn’t sold (much less integrated) by PacComm, the vendor of a second generation WA4DSY 56k Modem. For New Packet Radio, the add-on unit is a specific “DMR” power amplifier that offers fast-enough Transmit / Receive switching to be compatible with New Packet Radio. Thus neither unit was “plug and play” and thus a intimidating to those that weren’t comfortable with building radios from building blocks such as integrating the units required for a usable system.
- The designers of both units designed the capability of a repeater / digipeater into the system (but still intimidating to implement).

New Packet Radio is open source; thus like the Tindie units, there could be a third implementation of an integrated system - by anyone.

My point in discussing all of the above is…

*There **really is** significant technological innovation occurring… **now**.. in Amateur Radio, such as New Packet Radio. But because such technological innovation isn’t backed by a company (like Icom) with a large marketing presence and budget to advertise it widely, and because New Packet Radio is high speed data communications (and thus, not considered by many to be “mainstream Amateur Radio”), such technological innovation remains largely unknown within Amateur Radio. No expensive ads doesn’t feed the Amateur Radio Publishing-Industrial Complex. Thus the lament expressed in the private email discussion thread is typical.*

Zero Retries is just one voice against the entropy effect in Amateur Radio that “there isn’t anything new and exciting happening”. If *you*, as a Zero Retries reader, want to “do something” about that, encourage your friends and co-conspirators that might be interested in “doing interesting things in Amateur Radio” to subscribe to Zero Retries. Numbers count, even in something as niche as Zero Retries.

Zero Retries Exhibit / Forum at Hamvention 2023?

Thinking through how frustrating the situation I describe in the previous article is… and writing that on the cusp of Hamvention 2022, with not much to look forward to that’s technologically innovative (at least as far as I’m aware as I write this)… *perhaps… just perhaps… I should try to fix that in time for Hamvention 2023*?

At the moment, this is purely a thought exercise, shared with you Zero Retries readers.

Imagine a Zero Retries table at the inside exhibits at Hamvention 2023:

- The Zero Retries book (which, I’m ~~threatened~~ *strongly encouraged*, to have completed long before Hamvention 2023).
- A showcase of data communications systems you can get hands on *now* that are “Zero Retries Interesting” such as:
  - Icom IC-9700 and Icom ID-RP1200VD - 128 kbps in 1240-1300 MHz.
  - New Packet Radio (user radio and “repeater”) - 512 kbps in 440-450 MHz.
  - NinoTNC running 9600 bps using IL2P Forward Error Correction (FEC).
  - Dire Wolf running > 9600 bps (I have some vintage Azden PCS-9600D radios that should be up to the task).
  - Maybe even a fun “poke” at the current radio vendors by displaying a working 19200 (or faster) packet radio system running 30+ year old Kantronics D4-10 radios (with crystals!) and a sign saying “radio vendors… can’t you come up with *something* at least as good as this 30 year old technology?!?!?!”
- Possibly a Forum that explains all of this in a presentation?

Note that I’m not proposing to evangelize Amateur Radio Emergency Data Network (AREDN) microwave networking at the Zero Retries exhibit… but not because I don’t think AREDN isn’t worth evangelizing. Quite the opposite - I think AREDN is *so worth evangelizing* that AREDN should have its own exhibit, not just an “and also…” mention at the Zero Retries exhibit.

The point of the (again… *speculative*…) Zero Retries Hamvention 2023 exhibit and Forum talk would be to highlight to Hamvention audience (at far as I’m aware, the largest Amateur Radio gathering in the world) *just how much technological innovation is actually occurring right now in Amateur Radio!*

But, the reality is that while writing Zero Retries is a sustainable solo effort, tackling something like the above is a different level, that would require advance planning, more personpower, significant coordination, and some funding (such as a “Send Zero Retries to Hamvention” Kickstarter campaign).

Again, *at the moment*, this is purely a thought exercise, shared with you Zero Retries readers. If this idea lands with deafening silence, as has happened with some of my previous thought exercises in Zero Retries, then that’s a good proxy for the idea not being viable.

G8BPQ Adds Support for KISS to QtTermTCP Terminal

KISS in this context is not only “Keep It Simple, Stupid” but also a minimalist interface protocol between a host computer and a “Terminal Node Controller - TNC”. I’m constantly amazed that Wikipedia provides detail on esoteric subjects such as KISS TNCs. (One of these days I’ll have to dig into the authoring of these subjects and publicly thank them.) KISS was developed to “gut out” the Packet Radio portions of firmware in TNCs and moved that into the computer so that the TCP/IP could be used (back then, KA9Q NOS, and since then, many, many derivatives).

The problem with a KISS TNC, such as the NinoTNC that has a (non-network) serial interface (once upon a time, RS-232, but now USB) is that unless you know exactly how to configure the computer in advance, with software that understands the KISS protocol and various parameters such as bps, etc., it can be confounding to do basic troubleshooting and testing without resorting to a “full network stack” such as NOS, the AX.25 stack in Linux, etc.

Because of the growing popularity of the NinoTNC, John Wiseman G8BPQ has added KISS capability to his QtTermTCP software.

> I've uploaded an experimental version of QtTermTCP that includes KISS support to my Test download area.
>
> I've updated the docs at https://www.cantab.net/users/john.wiseman/Documents/QtTermTCP.html
>
> But the links in that doc refer to the released version. Use these links for the test versions:
>
> Windows https://www.cantab.net/users/john.wiseman/Downloads/Test/QtTermTCP.zip
>
> i386 Linux https://www.cantab.net/users/john.wiseman/Downloads/Test/QtTermTCP
>
> pi Linux https://www.cantab.net/users/john.wiseman/Downloads/Test/piQtTermTCP
>
> I don't have a NinoTNC so have only tested offline, linking to a BPQ Node or using two copies of QtTermTCP with a loopback port.
>
> This is very much a test version - please send me any problem reports, comments or suggestions.
>
> ps There isn't a version for Android yet. That should follow once I'm happy that the code is working.

It's a common misconception that KISS, Bulletin Board Systems, etc. are relevant only to conventional 1200 bps Packet Radio, etc. but all of this Packet Radio Networking capability is usable (even more so) as over the air data rates increase. VARA FM provides speeds up to 25 kbps, and there are several projects in work to push the over the air data rates upward. This is a useful new capability - Kudos to G8BPQ!

ZR > BEACON

- **Franklin Antonio N6NKF Transitions to Silent Keyboard.**
  I knew N6NKF only by his significant reputation in Amateur Radio, thus I can only do justice to N6NKF's passing by restating N6NKF's epitaph from AMSAT-NA's ANS-135 AMSAT News Service Weekly Bulletins for May 15:
  Phil Karn, KA9Q writes: "Last night I got the sad news that Franklin Antonio, N6NKF, one of the founders of Qualcomm and my boss for most of my 20 years there, has passed away. In recent years he'd turned to philanthropy, giving $30M to the University of California San Diego (UCSD) for a building named after him. The dedication was just two days ago, and he didn't show up. He'd also donated $3M to the Allen Telescope Array for a new broadband antenna feed, but more importantly he had provided them with a lot of engineering management and guidance that will be impossible to replace. AMSAT members probably know him best as the author of the Instant Track orbital tracking software that AMSAT sold for many years." Bob McGwier, N4HY writes: Franklin and Mike Valentine donated money to AMSAT GEO P4B development that got us all the way to yes from the USAF and NASA. He was always after me to do more for SETI Institute and the Allen Telescope Array. He was instrumental in support of first four Microsats. When we got the flight computers, they arrived "some assembly required". He ordered the Qualcomm microelectronics lab to help fix the assembly issues with the first ever 8 layer boards flown to orbit. When we had things to discuss, we would ride around in his big white Cadillac convertible. The back seat was loaded with empty soda cans. He was infamous at Qualcomm for occasionally dumping many of the cans near his parking spot. The grounds crew was prepared and cleaned them up quickly. Whenever I visited in the newer building that contained his office, he encouraged me to ride his Segway around the floor, where all the C suite offices were located. I will miss this brilliant eccentric engineer. RIP Franklin. RIP to a friend of AMSAT. [ANS thanks Phil Karn, KA9Q, for the above information]

- **NinoTNC to Get HF Modes**
  From Tadd Torborg KA2DEW via the private Facebook group (sigh…) "Packet radio systems and information" (thus, not linkable):
  NinoTNC is getting HF modes. It will be a free firmware update. We will be testing next week. http://ninotnc.info.
  In the comments:
  HF modes like 300 baud AX.25? Or HF modes like ARDOP, etc?
  More like 300 baud AX.25. That one, and two others that are home-brew. One is 75-baud with rich Forward Error Correction. There is a one-to-one relationship between the packets delivered via KISS and the transmissions made, ditto on receive. Good packet RX goes straight to the Host. So we can't do multiple packets simultaneously like FT8/JS8CALL or selective ARQ in the firmware. Nino is working on a specification that will be included in the IL2P literature on the TARPN website, as required per part 97. It's also fine if anybody else wants to clone the protocols.
  This is an interesting development / evolution of the NinoTNC. This could be a neat fit for the many low-cost HF radios that have been emerging of late, perhaps even a good fit for such radios that can do 29 MHz or 50-54 MHz for regional communications.

- **Winlink using VARA on Raspberry Pi**
  Despite no interest from VARA's developer, there are efforts continuing to make VARA work without needing a Windows PC, especially to run on Linux on a Raspberry Pi, such as this GitHub project - WheezyE / Winelink.

- **DOS (Networking) Lives!**
  Good reference page about implementing various networking systems on DOS and FreeDOS. It just tickles me that folks are keeping DOS (especially the impressive effort that is FreeDOS) alive and working in this era that presumes "Linux is the answer… what was the question?".

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with wireless technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- Pseudostaffer Dan Romanchik KB6NU for continuing to spot, and write about "Zero Retries Interesting" items on his blog that I don't spot on my own.
- Southgate Amateur Radio News consistently surfaces "Zero Retries Interesting" stories.
- The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

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More bits from Steve Stroh N8GNJ:

- SuperPacket blog - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted in beautiful Bellingham, Washington, USA
2022-05-20

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1

Commendably, Icom recently debuted the ID-RP1200VD - a new DD (or D-Star Digital Voice) repeater. I have no information (yet) whether any of the flaws of the original DD repeater have been fixed in this new unit.